[Claim 1]   1. A method for a video encoder to encode video data into a video bit stream, the video data includes at least a picture, the method comprising:

(a)   receiving an available memory bandwidth value;
(b)   determining an encoding type for the picture according to the available memory bandwidth value; and
(c)   encoding the picture using the encoding type.

[Claim 2]   2. The method of claim 1, wherein step (b) further comprises:

determining the encoding type for the picture by comparing the available memory bandwidth value with a first threshold value; and setting the encoding type of the picture as intra encoding when the available memory bandwidth value is less than the first threshold value.

[Claim 3]   3. The method of claim 2, wherein step (b) further comprises:

if the available memory bandwidth value is not less than the first threshold value, comparing the available memory bandwidth value with a second threshold value; and setting the encoding type of the picture as predictive encoding when the available memory bandwidth value is between the first and second threshold values.

[Claim 4]   4. The method of claim 3, further comprising:

adaptively updating the first or second threshold value while encoding the video data.

[Claim 5]   5. The method of claim 2, wherein step (b) further comprises:

if the available memory bandwidth value is not less than the first threshold value, comparing the available memory bandwidth value with a second threshold value; and

setting the encoding type of the picture as bi-directionally predictive encoding when the available memory bandwidth value is greater than the second threshold value.

[Claim 6]   6. The method of claim 5, further comprising:

adaptively updating the first or second threshold value while encoding the video bit stream.

[Claim 7]   7. The method of claim 1, wherein the picture is a frame picture or a field picture.

[Claim 8]   8. The method of claim 1, wherein the encoding type is intra encoding, predictive encoding, or bi-directionally predictive encoding.

[Claim 9]   9. A method for a video encoder to encode video data into a video bit stream, the video data includes at least a picture, the picture includes a plurality of blocks, the method comprising:

(a)   receiving an available memory bandwidth value;
(b)   determining an encoding type for the block according to the available memory bandwidth value; and
(c)   encoding the block using the encoding type.

[Claim 10]   10.   The method of claim 9, wherein the picture is a frame picture or a field picture.

[Claim 11]   11.   The method of claim 9, wherein the block is a macroblock.

[Claim 12] 12.   The method of claim 9, wherein the encoding type of the block is intra encoding, forward motion compensation encoding, backward motion compensation encoding, or bi-directional motion compensation encoding.

[Claim 13] 13.   The method of claim 9, wherein step (b) further comprises:

determining the encoding type for the block by comparing the available memory bandwidth value with a threshold; and
setting the encoding type of the block as intra encoding when the available memory bandwidth value is less than the threshold value.

[Claim 14] 14.   The method of claim 13, wherein step (b) further comprises:

when the available memory bandwidth value is not less than the threshold value, determining a plurality of candidate motion estimation types and adjusting a plurality of search ranges associated with the candidate motion estimation types according to the available memory bandwidth value and an encoding type of the picture;
performing motion estimation for the block based on the candidate motion encoding types; and
comparing prediction errors of the motion estimation types to identify a motion estimation reference block having a minimum prediction error for determining the encoding type for the block.

[Claim 15] 15.   The method of claim 14, wherein step (b) further comprises:

performing a first encoding test on the block using intra encoding;

performing a second encoding test on the block using the motion estimation reference block; and

comparing results of the first and second encoding tests to determine the encoding type for the block.

[Claim 16] 16.   The method of claim 13, wherein step (b) further comprises:

when the available memory bandwidth value is not less than the threshold value, determining a motion estimation type and adjusting a search range associated with the motion estimation type according to the available memory bandwidth value and an encoding type of the picture for determining the encoding type for the block.

[Claim 17] 17.   The method of claim 16, wherein step (b) further comprises:

performing a first encoding test on the block using intra encoding;
performing a second encoding test on the block using the motion estimation type; and
comparing results of the first and second encoding tests to determine the encoding type for the block.

[Claim 18] 18.   The method of claim 13, further comprising:

adaptively updating the threshold value while encoding the picture.

[Claim 19] 19.   The method of claim 9, wherein the encoding type of the block is intra encoding or forward motion compensation encoding when an encoding type of the picture is predictive encoding.

[Claim 20] 20.   The method of claim 9, wherein the encoding type of the block is intra encoding, forward motion compensation encoding, backward motion compensation encoding, or bi-directional motion compensation encoding when an encoding type of the picture is bi-directionally predictive encoding.

[Claim 21] 21.   The method of claim 9, wherein the encoding type of the block is forward motion compensation encoding, backward motion compensation encoding, or bi-directional motion compensation encoding when an encoding type of the picture is bi-directionally predictive encoding.

[Claim 22] 22.   A method for performing a motion estimation on a block of a picture, comprising:

(a)   receiving an available memory bandwidth value;
(b)   determining a motion estimation type and a search range associated with the motion estimation type for the block according to the available memory bandwidth value; and
(c)   performing the motion estimation on the block according to the motion estimation type and the search range.

[Claim 23] 23.   The method of claim 22, wherein the block is a macroblock.

[Claim 24] 24.   The method of claim 22, wherein the motion estimation type is forward estimation, backward estimation, or bi-directionally estimation.

[Claim 25] 25.   The method of claim 22, wherein step (b) further comprises determining a motion type for the block according to the motion estimation type, and step (c) further comprises performing the motion

estimation on the block according to the motion estimation type, the search range, and the motion type.

[Claim 26] 26.   The method of claim 22, wherein step (c) further comprises using a full search motion estimation algorithm to perform the motion estimation on the block.

[Claim 27] 27.   The method of claim 22, wherein step (b) further comprises determining a total number of search levels and a search range of each search level according to the available memory bandwidth value; and step (c) further comprises using a hierarchical search motion estimation algorithm to perform the motion estimation on the block.

[Claim 28] 28.   The method of claim 22, wherein step (b) further comprises:

   determining the motion estimation type and the search range for the block according to the available memory bandwidth value and an encoding type of the picture.

[Claim 29] 29.   The method of claim 28, wherein the encoding type of the picture is intra encoding, predictive encoding, or bi-directionally predictive encoding.

[Claim 30] 30.   The method of claim 28, wherein step (b) further comprises determining a total number of search levels and a search range of each search level for the block according to the encoding type of the picture and the available memory bandwidth value; and step (c) further comprises using a hierarchical search motion estimation algorithm to perform the motion estimation on the block.

[Claim 31] 31. The method of claim 22, wherein the picture is a frame picture or a field picture.

[Claim 32] 32.　　An apparatus for encoding video data into a video bit stream, comprising:

means for receiving an available memory bandwidth value;
means for determining an encoding type for the video bit stream according to the available memory bandwidth value; and
means for encoding the video bit stream using the encoding type.

[Claim 33] 33.　　An apparatus for performing a motion estimation on a block of a picture, comprising:

first means for receiving an available memory bandwidth value;
second means for determining a motion estimation type and a search range associated with the motion estimation type for the block according to the available memory bandwidth value; and
third means for performing the motion estimation on the block according to the motion estimation type and the search range.

[Claim 34] 34.　　The apparatus of claim 33, wherein the motion estimation type is forward estimation, backward estimation, or bi-directionally estimation.

[Claim 35] 35.　　The apparatus of claim 33, wherein the second means further comprises determining a motion type for the block according to the motion estimation type, and the third means further performs the motion estimation on the block according to the motion estimation type, the search range, and the motion type.

[Claim 36] 36.　　The apparatus of claim 33, wherein the third means further performs the motion estimation on the block using a full search motion estimation algorithm.

[Claim 37] 37.   The apparatus of claim 33, wherein the second means further determines a total number of search levels and a search range of each search level according to the available memory bandwidth value, and the third means further performs the motion estimation on the block using a hierarchical search motion estimation algorithm.

[Claim 38] 38.   A video encoder for encoding video data into a video bit stream, comprising:

a video interface for receiving the video data; and
an encoding module electrically connected to the video interface for adaptively determining an encoding type for the video bit stream according to an available memory bandwidth value, and then for encoding the picture using the encoding type.

[Claim 39] 39.   The video encoder of claim 38, further comprising:

a motion estimator electrically connected to the video interface and the encoding module, the motion estimator for adaptively determining a motion estimation type and a search range associated with the motion estimation type for the block according to an available memory bandwidth value; and for performing the motion estimation on the block according to the motion estimation type and the search range.

[Claim 40] 40.   The video encoder of claim 39, wherein the motion estimator performs the motion estimation on the block using a full search motion estimation algorithm or a hierarchical search motion estimation algorithm.